Attorney Docket No. LSH-0002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
JIANFENG CHEN et al	:	Confirmation No. 1047
Serial No.: 10/707,048	:	Group Art Unit 1714
Filed: November 12, 2003	:	Examiner ANTHONY, Joseph David
For: ULTRAFINE MODIFIED ALUMINUM HYDROXIDE AND ITS PREPARATION		

DECLARATION UNDER 37 CFR 1.132

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We, Jianfeng Chen, Fen Guo, Lei Liang, and Zhigang Shen, do hereby declare as follows:

1. We are joint-inventors of the subject matter described and claimed in the above-identified U.S. patent application 10/707,048.

2. We have read and are familiar with the specification filed in the US patent application 10/707,048, and with the Final Office Action in the present application issued on December 4, 2006.

3. We, individually or jointly conducted the following analyses, directly or by others working our instruction and supervision, regarding the oxalic-modified aluminum hydroxide that is claimed in US application 10/707,048, and component compounds thereof.

4. The **x-ray diffraction (XRD)** patterns of three kinds of aluminum hydroxide crystals were obtained from Materials Data, Inc.. The three types of crystals were gibbsite,

nordstrandite and bayerite. The XRD patterns for these three are shown in Exhibits IA, IB, and IC, attached.

5. Upon comparison with the XRD of the oxalic-modified aluminum hydroxide shown in Figure 1 of the present application, it is our opinion that the XRD of the oxalic-modified aluminum hydroxide is different from those of the three commercially available aluminum hydroxide crystals.

6. An XRD figure library was viewed, and an aluminum hydroxide crystal was not found that had a XRD pattern similar to that of the oxalic-modified aluminum hydroxide.

7. **Fourier Transform Infrared (FTIR)** spectra were obtained for the following standard compounds and compositions:

Compound/composition	Exhibit #	Carboxyl peak	Source
$C_2H_2O_4$ (anhyd. oxalic acid, mixed with paraffin)	IIA IIB (pg 2-A))	1730 1730	Handbook* Aldrich **
$C_2H_2O_4 \cdot 2H_2O$ (dihydrate oxalic)	IIC	1692	Spectral ***
$C_2H_2O_4 \cdot 2H_2O$ (dihydrate oxalic, mixed with paraffin)	IID	1685	Spectral ***
HCOOH (formic acid)	IIE	1722	Spectral ***
ATH (mixed with paraffin)	IIF	none	Spectral ***

Sources: * Handbook of analytical chemistry. The part III, spectrum analysis-The Second Edition

** Aldrich Library of FT-IR Spectra

*** Spectral Database for Organic Compounds

8. It is well known that the IR pattern site of a carboxyl peak will change slightly under the influence of other groups in the compound or in the composition. The carboxyl peak for formic acid is 1722. Under the influence of a second carboxyl peak (in oxalic acid), the carboxyl peak is 1730 and further with water of hydration, the carboxyl peak shifts to 1692 (when mixed with KBr salt) and 1685 (in paraffin).

9. Figure 3 of the present application shows the FTIR for the oxalic-modified aluminum hydroxide, showing a peak at about 1713. Since the ATH (as one of the reactants) does not have a carboxyl peak, it is our conclusion that the peak at 1713 in the oxalic-modified aluminum hydroxide is caused by the presence of the other reactant, oxalic acid.

10. We also note that the FTIR for the oxalic-modified aluminum hydroxide illustrated in Figure 3 was measured using a Nicolet-210 FTIR (USA), and that the oxalic-modified aluminum hydroxide had been mixed with KBR and pressed into pellets before recording the spectra that became Figure 3.

11. Thermal Gravimetric Analysis (TGA, or TA for short) was performed on a mixture of analytical-grade oxalic acid (hydrated) and aluminum hydroxide (ATH) at a weight ratio of 1:1, resulting in the scan shown in Exhibit III. A model STA 499C from Netzsch Inc. (Germany) was used and operated at a heating rate of 10°C/minute in a nitrogen atmosphere.

12. Exhibit III shows that two peaks come off for oxalic acid; the first peak shows the loss of water of hydration at 115° C, and the second peak shows its decomposition at 202° C. There is also one peak for aluminum hydroxide as it decomposes at 302° C.

13. Upon comparison with the TA analysis of the oxalic-modified aluminum hydroxide shown in Figure 2, which shows only one peak at about 400° C, it is our opinion that

the oxalic-modified aluminum hydroxide is a single compound having a chemically bonded structure consisting aluminum hydroxide and the oxalic acid moiety, and it is not a physical or chemical mixture of the two components.

We further declare that all statements made of our knowledge are true and that all statements made on information and belief are believed to be true; further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 USC 1001 and may jeopardize the validity of the application or any patent issuing thereon.

2007.04.03. — Date
Jianfeng Chen (陈建峰) — Jianfeng Chen

2007.04.03. — Date
Fen Guo (郭芬) — Fen Guo

2007.04.03. — Date
Lei Liang (梁磊) — Lei Liang

2007.04.03. — Date
Zhigang Shen (沈志刚) — Zhigang Shen

18 USC 1001: *"Whoever in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both."*

EXHIBIT IA

PDF833-0018: QM=Common(+); d=Diffractometer; I=(Unknown) — PDF Card

Gibbsite, syn
Al(OH)3

Radiation=CuKa1 — Lambda=1.5406 — Filter=
Calibration= — 2T=18.282-90.716 — I/Ic(RIR)=1.0
Ref: Level-1 PDF

Monoclinic, P21/n(14) — Z=8 — mp=
CELL: 8.6552 x 5.0722 x 9.7161 <90.0 x 94.607 x 90.0> — P.S=
Density(c)=2.4 — Density(m)= — Mwt= — Vol=425.2
Ref: Ibid.

Strong Lines: 4.85/X 4.37/7 1.46/6 2.39/6 4.32/5 2.05/4 2.45/4 1.75/3

50 Lines. Wavelength to Compute Theta = 1.54056Å(Cu). I%-Type = (Unknown)

#	d(Å)	I(f)	(h k l)	2-Theta	Theta	1/(2d)	#	d(Å)	I(f)	(h k l)	2-Theta	Theta	1/(2d)
1	4.8486	100.0	(0 0 2)	18.282	9.141	0.1031	26	1.6974	4.0	(1 2 4)	53.975	26.988	0.2946
2	4.3711	70.0	(1 1 0)	20.299	10.150	0.1144	27	1.6845	30.0	(3 1 4)	54.423	27.211	0.2968
3	4.3187	50.0	(2 0 0)	20.548	10.274	0.1158	28	1.6576	18.0	(1 3 0)	55.381	27.691	0.3016
4	3.3590	17.0	(2 0-2)	26.514	13.257	0.1489	29	1.5926	7.0	(4 1-4)	57.850	28.925	0.3140
5	3.3122	30.0	(1 1-2)	26.895	13.448	0.1510	30	1.5865	7.0	(3 1-5)	58.093	29.047	0.3152
6	3.1829	25.0	(1 1 2)	28.010	14.005	0.1571	31	1.5739	16.0	(5 0-3)	58.603	29.302	0.3177
7	3.1054	13.0	(1 0-3)	28.724	14.362	0.1610	32	1.5525	3.0	(2 0-6)	59.492	29.746	0.3221
8	2.4658	25.0	(3 1-1)	36.406	18.203	0.2028	33	1.4846	8.0	(2 1-6)	62.510	31.255	0.3368
9	2.4522	40.0	(0 2 1)	36.615	18.308	0.2039	34	1.4577	60.0	(3 2 4)	63.798	31.899	0.3430
10	2.4224	15.0	(0 0 4)	37.082	18.541	0.2064	35	1.4405	18.0	(4 1-5)	64.651	32.326	0.3471
11	2.3851	55.0	(3 1 1)	37.683	18.842	0.2096	36	1.4115	19.0	(3 3-2)	66.147	33.074	0.3542
12	2.3471	4.0	(1 2 1)	38.317	19.159	0.2130	37	1.4021	13.0	(3 1-6)	66.648	33.324	0.3566
13	2.2899	15.0	(3 1-2)	39.313	19.657	0.2184	38	1.3808	6.0	(3 3 2)	67.815	33.907	0.3621
14	2.2464	20.0	(0 2 2)	40.107	20.053	0.2226	39	1.3620	10.0	(0 2-6)	68.881	34.441	0.3671
15	2.1924	2.0	(1 2-2)	41.139	20.569	0.2281	40	1.3311	7.0	(1 2 6)	70.715	35.358	0.3758
16	2.1647	27.0	(3 1 2)	41.689	20.845	0.2310	41	1.3247	4.0	(2 2-6)	71.109	35.554	0.3774
17	2.0846	4.0	(1 1 4)	43.373	21.686	0.2399	42	1.2999	3.0	(4 1-6)	72.679	36.339	0.3845
18	2.0489	40.0	(3 1-3)	44.166	22.083	0.2440	43	1.2316	3.0	(6 2-2)	77.428	38.714	0.4060
19	2.0234	3.0	(2 2-2)	44.752	22.376	0.2471	44	1.2287	2.0	(3 3 4)	77.795	38.897	0.4076
20	1.9944	28.0	(0 2 3)	45.439	22.720	0.2507	45	1.2160	12.0	(4 2 5)	78.611	39.305	0.4112
21	1.9637	12.0	(1 2-3)	46.190	23.095	0.2548	46	1.2116	7.0	(1 4 2)	78.952	39.476	0.4127
22	1.9200	15.0	(1 2 3)	47.305	23.652	0.2604	47	1.1791	4.0	(1 1-8)	81.578	40.789	0.4241
23	1.8042	30.0	(3 2-2)	50.547	25.273	0.2771	48	1.1452	4.0	(6 2-4)	84.539	42.269	0.4366
24	1.7517	30.0	(0 2 4)	52.174	26.087	0.2854	49	1.0933	3.0	(4 4 0)	89.586	44.793	0.4573
25	1.7365	4.0	(1 2-4)	52.665	26.333	0.2879	50	1.0826	4.0	(6 3-2)	90.716	45.358	0.4619

Simulation Parameters: Fixed-Slit Intensities, Two-Theta Range =18.28/92.72/0.01, FWHM = 0.1

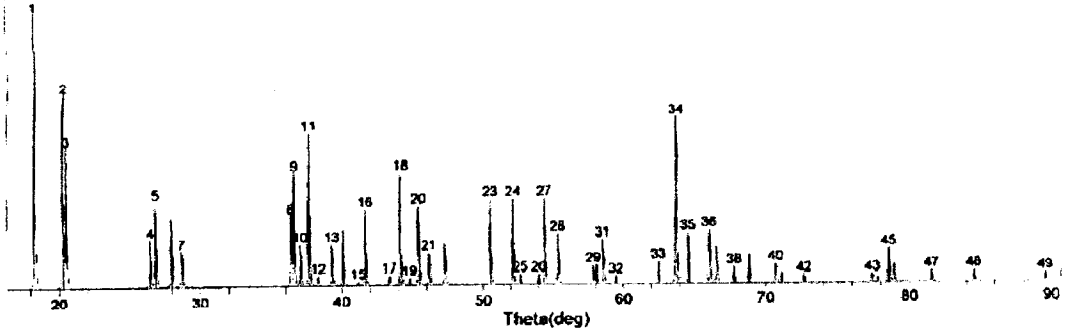


EXHIBIT IB

PDF Card

Nordstrandite, syn

Al(OH)3

Radiation=CuKa1 Lambda=1.5406 Filter=

Calibration= 2T=18.508-68.708 I/Ic(RIR)=

Ref: Level-1 PDF

Triclinic, P1(1) Z=2 mp=

CELL: 5.082 x 5.127 x 4.98 <93.87 x 118.92 x 70.27> P.S=

Density(c)=2.436 Density(m)= Mwt= Vol=106.1

Ref: Ibid.

Strong Lines: 4.79/X 2.27/3 2.02/3 4.32/3 2.39/3 1.90/2 4.21/2 1.78/1

48 Lines. Wavelength to Compute Theta = 1.54056Å(Cu), I%-Type = (Unknown)

#	d(Å)	I(f)	(h k l)	2-Theta	Theta	1/(2d)	#	d(Å)	I(f)	(h k l)	2-Theta	Theta	1/(2d)
1	4.7900	100.0	(0 1 0)	18.508	9.254	0.1044	25	1.9020	20.0	(-2 1 1)	47.780	23.890	0.2629
2	4.3200	25.0	(0 0 1)	20.542	10.271	0.1157	26	1.8770	2.0	(0-1 2)	48.457	24.229	0.2664
3	4.2100	18.0	(1 0-1)	21.085	10.542	0.1188	27	1.8210	2.0	(-1 2 0)	50.048	25.024	0.2746
4	4.1600	12.0	(1 0 0)	21.341	10.671	0.1202	28	1.8040	4.0	(-2-2 2)	50.553	25.276	0.2772
5	3.8900	12.0	(1 1 0)	22.842	11.421	0.1285	29	1.7840	14.0	(-1-2 2)	51.160	25.580	0.2803
6	3.6100	8.0	(-1-1 1)	24.640	12.320	0.1385	30	1.7150	2.0	(0 2 2)	53.377	26.689	0.2915
7	3.4300	6.0	(0 1 1)	25.955	12.978	0.1458	31	1.7040	2.0	(-2 1 0)	53.750	26.875	0.2934
8	3.0300	4.0	(0-1 1)	29.454	14.727	0.1650	32	1.6680	4.0	(-1 2 2)	55.008	27.503	0.2996
9	2.8480	4.0	(-1 1 1)	31.384	15.692	0.1756	33	1.6530	4.0	(-3-1 2)	55.549	27.774	0.3025
10	2.7100	2.0	(-1 1 0)	33.026	16.513	0.1845	34	1.6320	2.0	(-1 0 3)	56.328	28.163	0.3064
11	2.5010	2.0	(-2-1 1)	35.878	17.938	0.1999	35	1.6180	2.0	(-2 0 3)	56.935	28.467	0.3094
12	2.4800	12.0	(1 1 1)	36.190	18.095	0.2016	36	1.5980	6.0	(-2-1 3)	57.836	28.918	0.3129
13	2.4650	8.0	(1 0 1)	36.572	18.286	0.2037	37	1.5720	4.0	(-3 0 2)	58.681	29.341	0.3181
14	2.3930	25.0	(-2 0 1)	37.554	18.777	0.2089	38	1.5600	2.0	(0 3 1)	59.177	29.589	0.3205
15	2.3330	6.0	(-1-2 1)	38.558	19.279	0.2143	39	1.5470	6.0	(-1-1 3)	59.725	29.862	0.3232
16	2.2710	30.0	(-1-1 2)	39.654	19.827	0.2202	40	1.5170	7.0	(0-2 2)	61.030	30.515	0.3296
17	2.2170	4.0	(2 1 0)	40.662	20.331	0.2255	41	1.4790	6.0	(3 1 0)	62.773	31.387	0.3381
18	2.1460	4.0	(-1 1 2)	42.070	21.035	0.2330	42	1.4650	2.0	(-2 2 1)	63.443	31.721	0.3413
19	2.1130	2.0	(-2-1 2)	42.759	21.379	0.2366	43	1.4410	14.0	(3 2 0)	64.626	32.313	0.3470
20	2.0740	4.0	(-2-2 1)	43.604	21.802	0.2411	44	1.4300	5.0	(0 1 3)	65.185	32.592	0.3497
21	2.0160	25.0	(1 2 1)	44.926	22.463	0.2480	45	1.4040	3.0	(-3 0 3)	66.546	33.273	0.3561
22	1.9910	2.0	(0-2 1)	45.521	22.761	0.2511	46	1.3880	2.0	(-1 3 1)	67.415	33.708	0.3602
23	1.9750	2.0	(1-1 1)	45.911	22.955	0.2532	47	1.3700	1.0	(-3 1 2)	68.423	34.211	0.3650
24	1.9450	6.0	(2 2 0)	46.661	23.330	0.2571	48	1.3650	1.0	(0 3 2)	68.708	34.354	0.3663

Simulation Parameters: Fixed-Slit Intensities, Two-Theta Range =18.51/70.71/0.02, FWHM = 0.1

EXHIBIT IC

PDF#20-0011: QM=Common(+); d=Diffractometer; I=(Unknown) | PDF Card

Bayerite, syn

Al(OH)3

Radiation=CuKa1 | Lambda=1.5406 | Filter=

Calibration= | 2T=18.825-86.423 | I/Ic(RIR)=

Ref: Level-1 PDF

Monoclinic, P21/a(14) | Z=4 | mp=

CELL: 5.062 x 8.671 x 4.713 <90.0 x 90.27 x 90.0> | P.S=

Density(c)=2.504 | Density(m)= | Mwt= | Vol=206.9

Ref: Ibid.

Strong Lines: 2.22/X 4.71/9 4.35/7 1.72/4 3.20/3 1.33/2 1.46/1 1.60/1

75 Lines, Wavelength to Compute Theta = 1.54056Å(Cu). I%-Type = (Unknown)

#	d(A)	I(f)	h	k	l	2-Theta	#	d(A)	I(f)	h	k	l	2-Theta	#	d(A)	I(f)	h	k	l	2-Theta
1	4.7100	90.0	0	0	1	18.825	26	1.7650	2.0	2	3	1	51.751	51	1.3680	2.0	2	5	1	68.537
2	4.3500	70.0	0	2	0	20.399	27	1.7230	40.0	2	0	2	53.110	52	1.3580	2.0	-3	1	2	69.113
3	4.1400	2.0	0	1	1	21.446	28	1.6950	2.0	-2	1	2	54.058	53	1.3480	2.0	2	4	2	69.699
4	3.2900	2.0	-1	2	0	27.080	29	1.6880	2.0	2	1	2	54.301	54	1.3330	18.0	-1	3	3	70.600
5	3.2000	30.0	1	1	1	27.857	30	1.6560	2.0	3	1	0	55.439	55	1.3200	2.0	-2	1	3	71.401
6	2.6990	4.0	1	2	1	33.165	31	1.6460	2.0	-2	4	0	55.805	56	1.3110	2.0	-3	2	2	71.967
7	2.5310	2.0	2	0	0	35.437	32	1.6410	2.0	1	5	0	55.990	57	1.3050	2.0	3	2	2	72.350
8	2.5100	2.0	1	3	0	35.743	33	1.6280	2.0	0	5	1	56.477	58	1.2770	2.0	-2	2	3	74.198
9	2.4840	2.0	0	3	1	36.434	34	1.6000	10.0	2	2	2	57.557	59	1.2650	2.0	4	0	0	75.022
10	2.4300	2.0	-2	1	0	36.962	35	1.5720	2.0	3	2	0	58.681	60	1.2640	2.0	2	5	0	75.796
11	2.3560	4.0	0	0	2	38.187	36	1.5540	8.0	2	4	1	59.429	61	1.2420	2.0	-3	3	2	76.660
12	2.2740	2.0	0	1	2	39.599	37	1.5230	2.0	-1	4	2	60.764	62	1.2370	2.0	3	3	2	77.027
13	2.2220	100.0	2	0	1	40.566	38	1.5200	2.0	1	4	2	60.897	63	1.2350	2.0	-1	4	3	77.175
14	2.1860	2.0	2	2	0	41.265	39	1.4920	2.0	-3	2	1	62.165	64	1.2330	2.0	1	4	3	77.323
15	2.1680	2.0	0	4	0	41.623	40	1.4840	2.0	-2	3	2	62.538	65	1.2320	2.0	0	6	2	77.398
16	2.1640	2.0	-2	1	1	41.704	41	1.4780	2.0	2	3	2	62.821	66	1.2230	2.0	-4	0	1	78.075
17	2.1560	2.0	2	1	1	41.866	42	1.4570	12.0	3	3	0	63.832	67	1.2120	8.0	2	6	1	78.921
18	2.0730	2.0	1	1	2	43.626	43	1.4450	8.0	0	6	0	64.426	68	1.1990	2.0	0	7	1	79.947
19	1.9930	2.0	-1	4	0	45.473	44	1.4310	2.0	2	5	0	65.133	69	1.1700	6.0	3	5	1	82.350
20	1.9830	4.0	-2	2	1	45.715	45	1.4200	2.0	-1	2	3	65.701	70	1.1610	2.0	-3	4	2	83.129
21	1.9690	2.0	0	4	1	46.059	46	1.4160	2.0	1	2	3	65.910	71	1.1590	2.0	4	3	0	83.304
22	1.9170	2.0	-1	2	2	47.383	47	1.3970	2.0	0	5	2	66.924	72	1.1570	2.0	3	4	2	83.481
23	1.9040	2.0	-2	3	0	47.727	48	1.3920	6.0	3	3	1	67.196	73	1.1370	2.0	0	2	4	85.292
24	1.8350	2.0	1	4	1	49.640	49	1.3810	2.0	0	6	1	67.803	74	1.1270	2.0	-4	3	1	86.232
25	1.8260	2.0	0	3	2	49.902	50	1.3700	2.0	-2	5	1	68.423	75	1.1250	2.0	4	3	1	86.423

Simulation Parameters: Fixed-Slit Intensities, Two-Theta Range =16.83/86.42/0.02, FWHM = 0.1

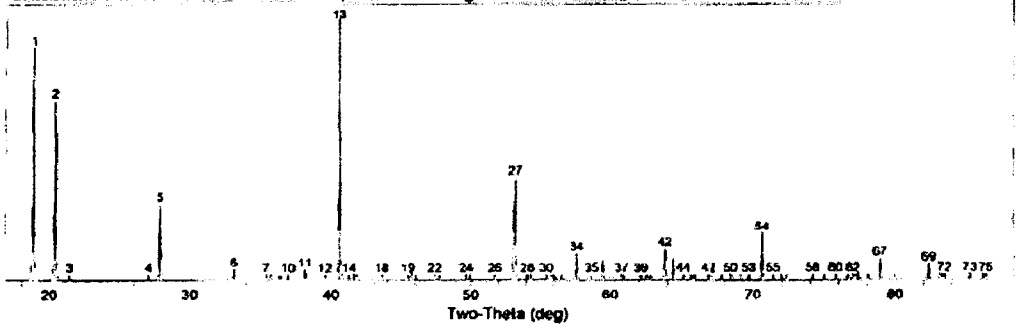
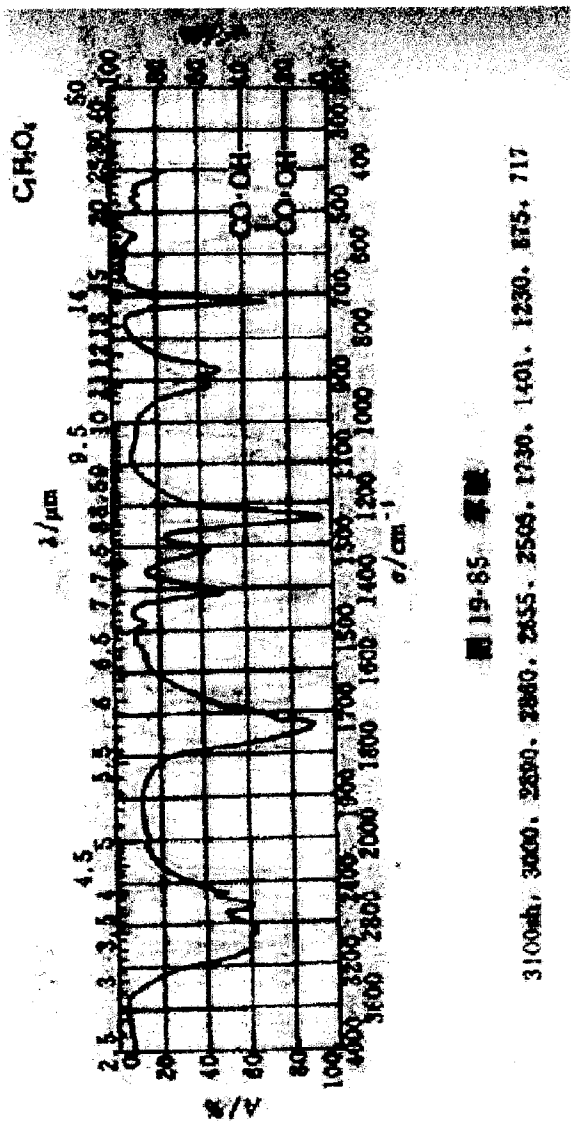


EXHIBIT IIA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CO·OH
CO·OH
λ/μm
σ/cm⁻¹
A/%
3100wh, 3000, 2650, 2860, 2555, 2505, 1730, 1401, 1230, 875, 717

EXHIBIT IIB-1

THE ALDRICH LIBRARY

of

FT-IR SPECTRA

Edition I

Volume 1

CHARLES J. POUCHERT

EXHIBIT IIB-2

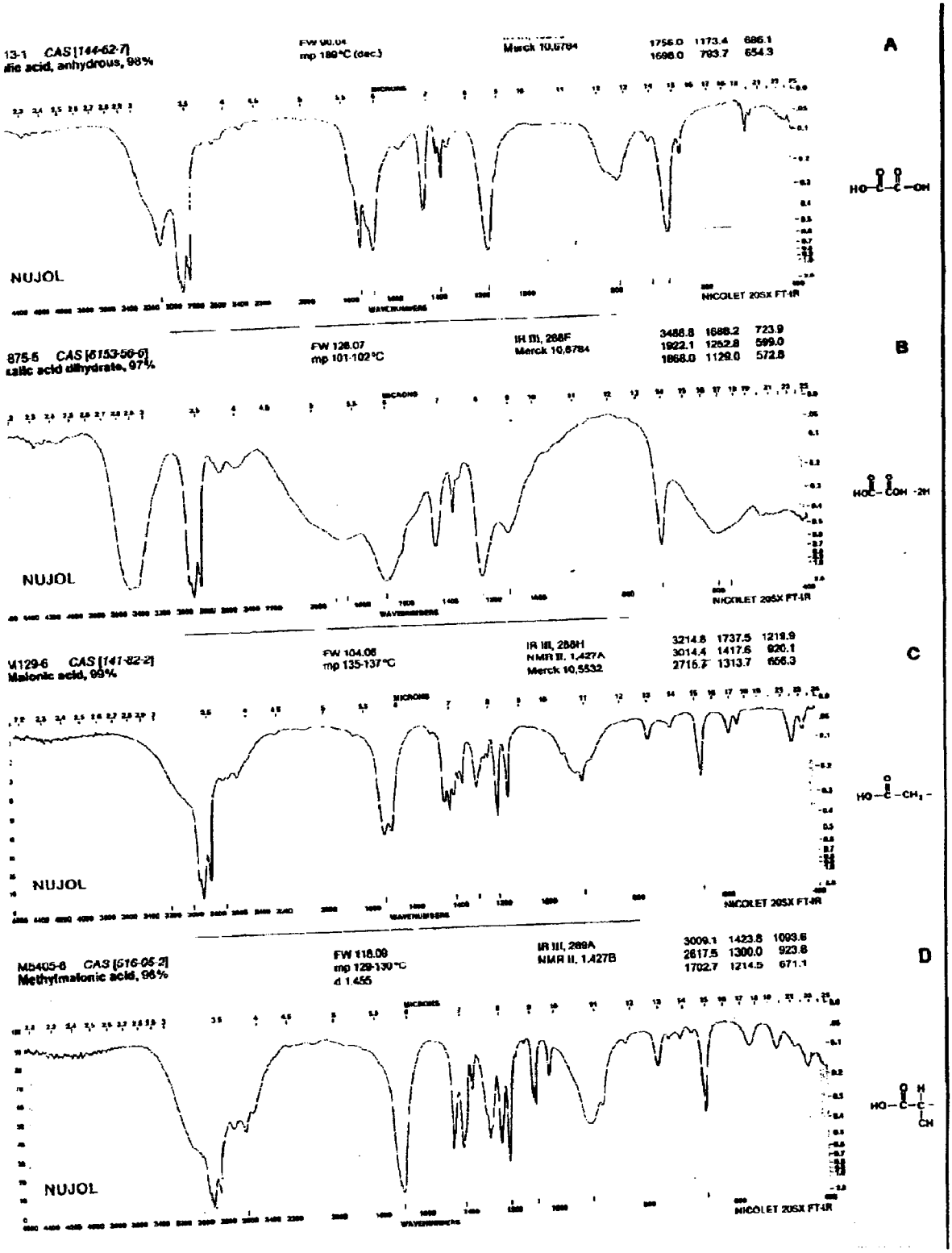

EXHIBIT IIC

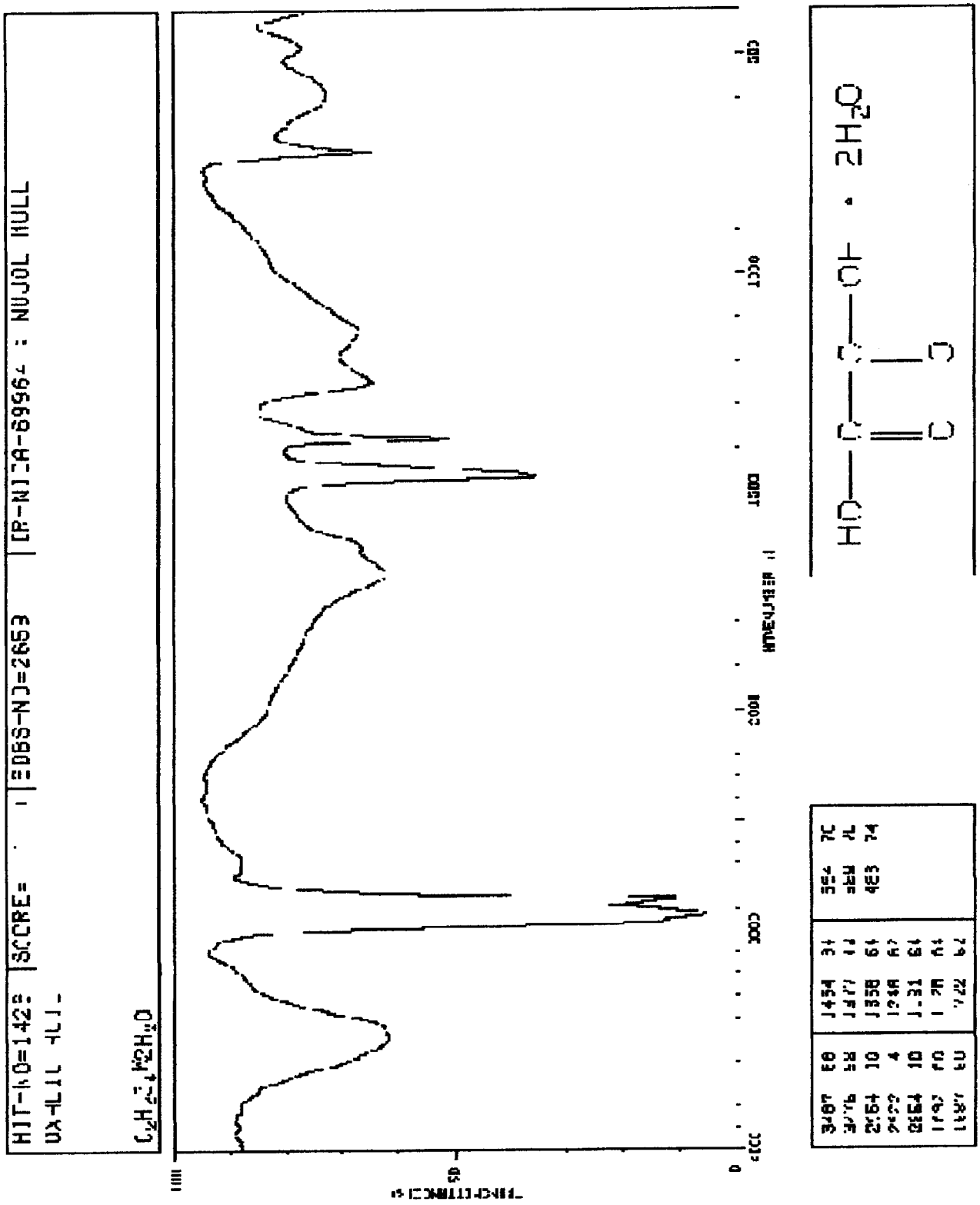
HIT-NO=1428
SCORE=
EOBS-NO=2653
ER-NIST-69964 : NUJOL MULL
C2H2O4.2H2O
HO—C(=O)—C(=O)—OH · 2H2O

EXHIBIT IID

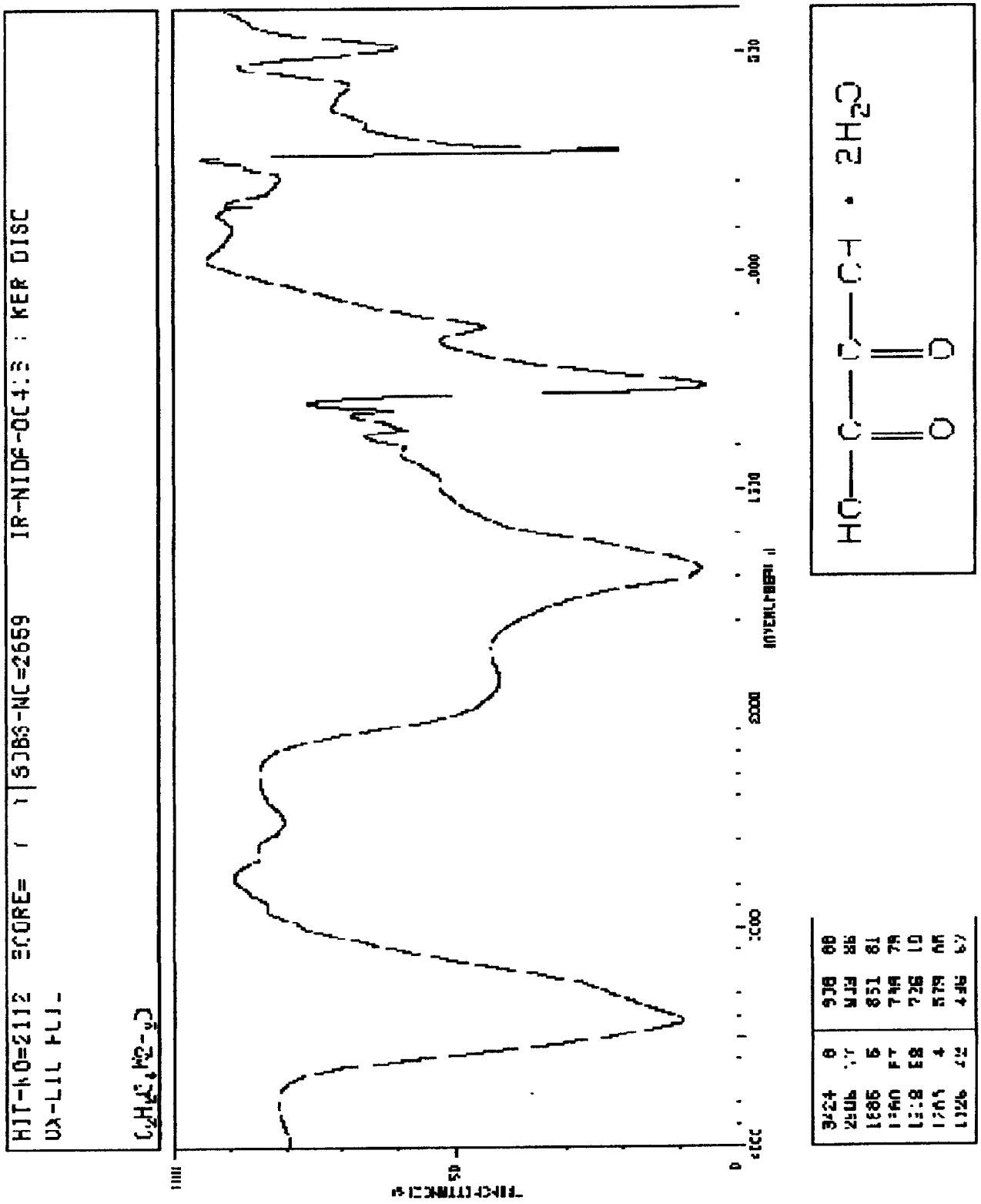
HIT-NO=2112 SCORE= 1 SDBS-NC=2659 IR-NIDA-OC4:3 : KER DISC
UX-LIL PLL
TRANSMITTANCE (%)
WAVENUMBER (cm-1)
4000
3000
2000
1500
1000
500
0
50
100
2H2O · HO—C—C—OH
O
O

EXHIBIT IIE

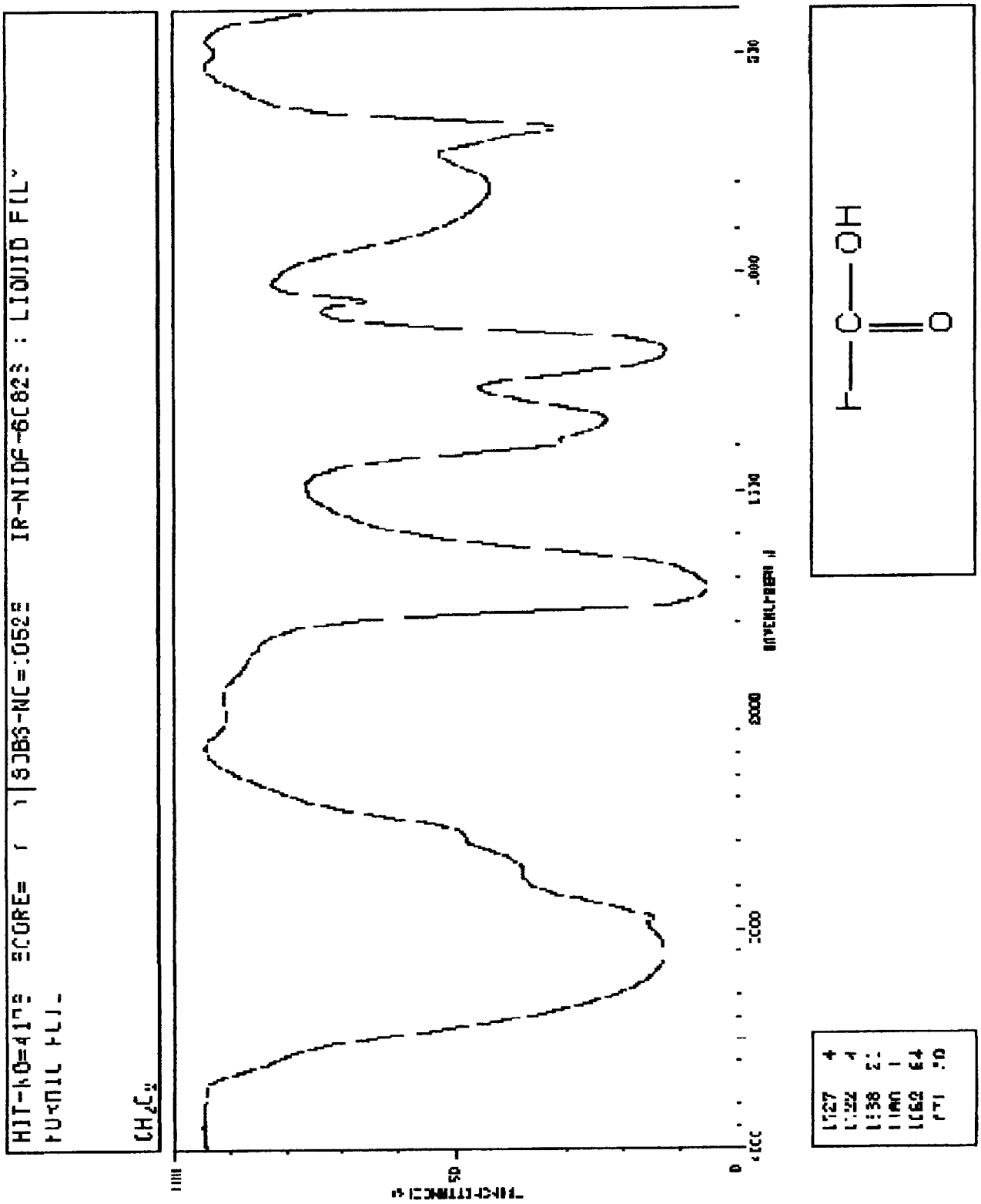
HIT-HO=4178 SCORE= r 1|SDBS-NC=:0528 IR-NIDF-6C823 : LIQUID FIL
FORMIC ACID
CH2Cl2
O
H—C—OH

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EXHIBIT IIF

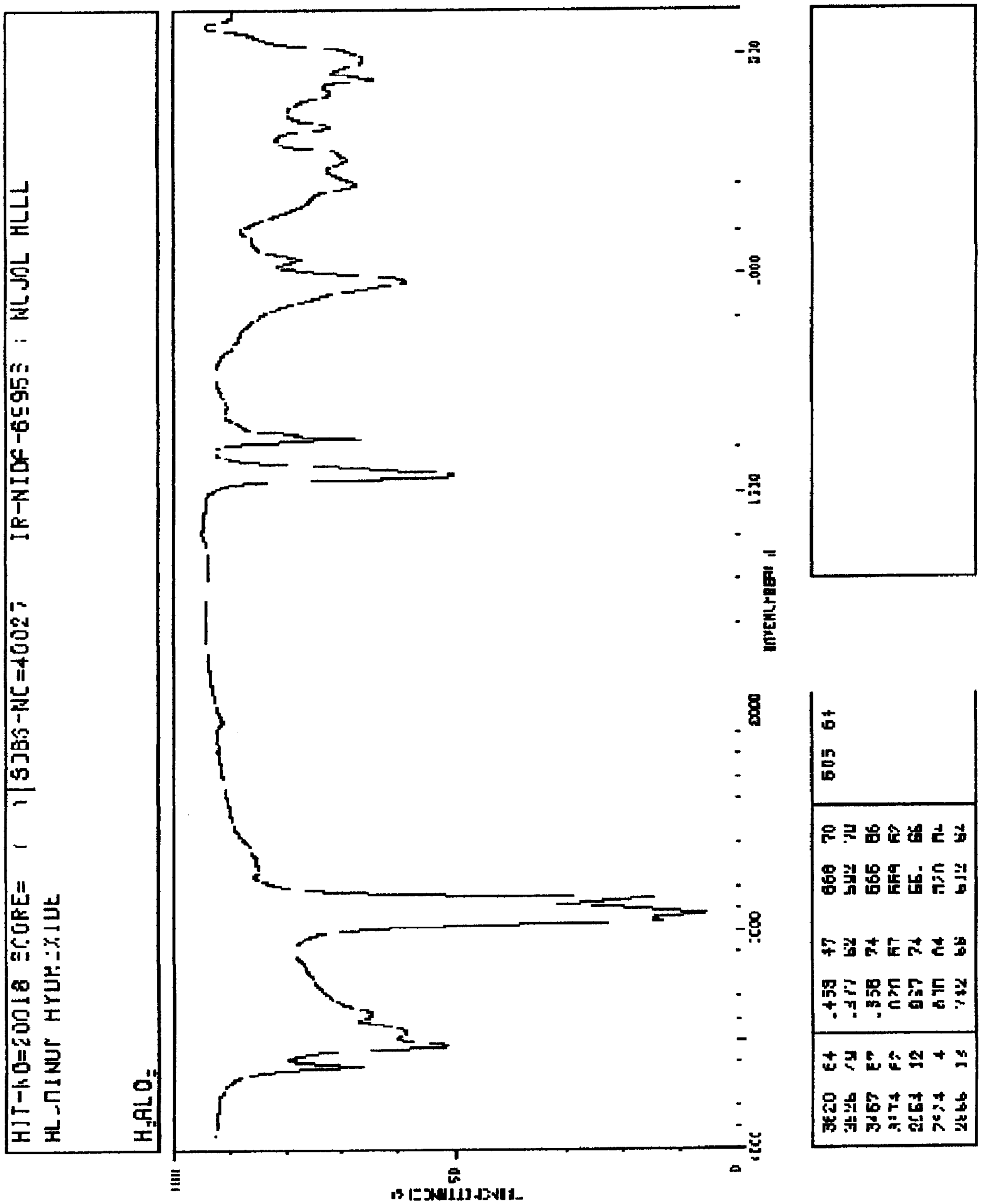
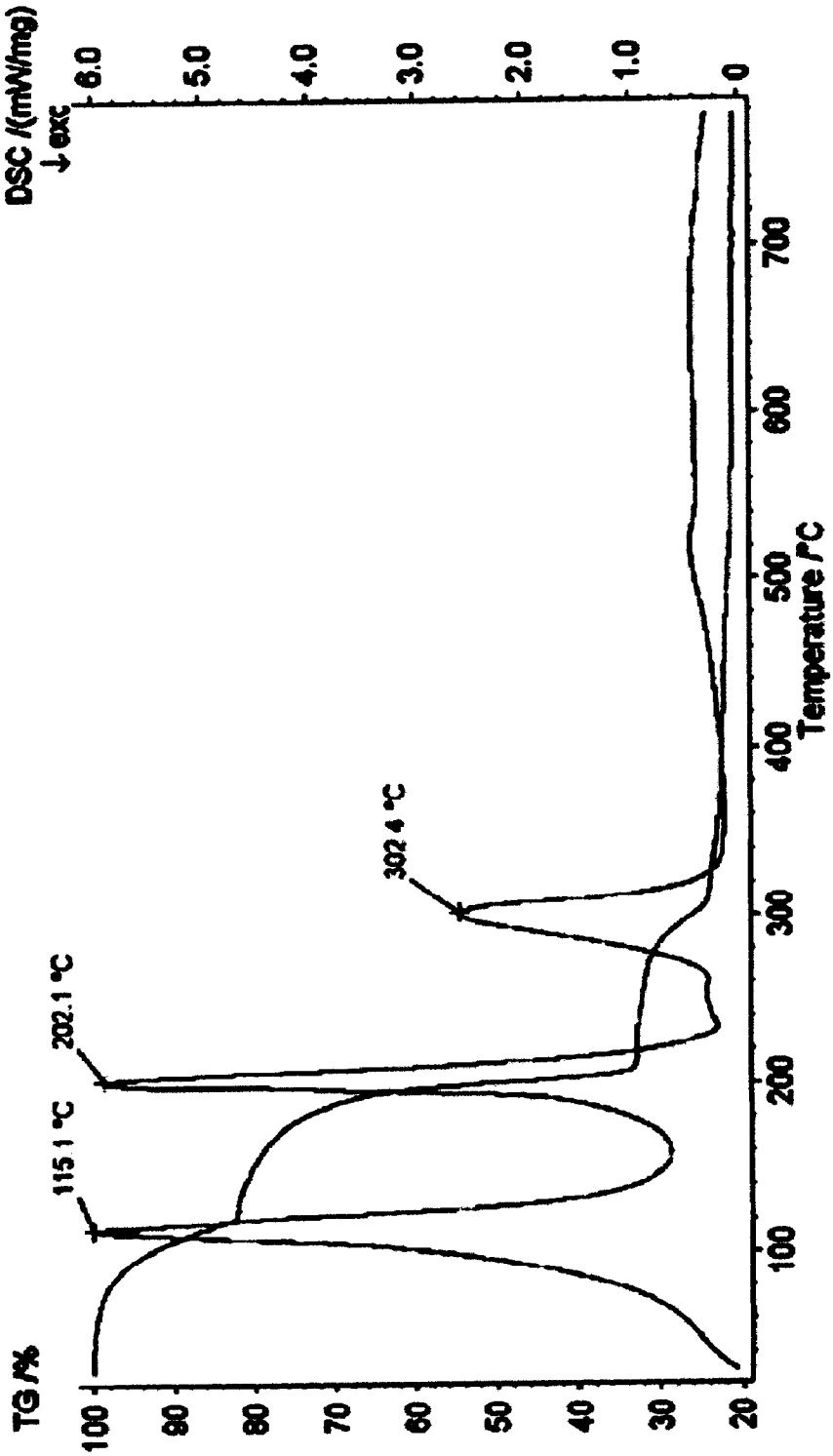


EXHIBIT III


DSC /(mW/mg)
↓exo
6.0
5.0
4.0
3.0
2.0
1.0
0
700
600
500
400
300
200
100
Temperature /°C
302.4 °C
202.1 °C
115.1 °C
TG /%
100
90
80
70
60
50
40
30
20